

# A Cure for Plum Pox Virus

**A**dental checkup every 6 months can save money and time—and sometimes, agony—later. Ditto for an annual physical exam. These preventive measures can identify, and often take care of, human health problems before they occur.

Some ARS crop research is also like that.

For example, ARS horticulturist Ralph Scorza, with help from French collaborator Michel Ravelonandro, has been working for the past 5 years on protecting U.S. fruit growers from plum pox virus. Though this deadly virus has not yet appeared in North America, it is now spreading in orchards throughout Europe. Recently, the virus was discovered in South America.

Prunus crops, which include plums, peaches, and apricots, brought U.S. growers about \$712 million in 1994.

Plum pox—sometimes known as Sharka—virus causes fruit to drop from affected trees 20 to 40 days before maturity, and it leaves the remaining fruit unmarketable. The disease is transmitted by aphids and by grafting.

"This virus causes severe damage and crop loss in plums, peaches, and apricots," Scorza says. "There is no remedy, once it attacks a tree."

But there may be a preventive strategy: Scorza and his colleagues have recently developed transgenic plum plants that resist the virus.

A coating of protein usually surrounds a virus, Scorza says. The scientists put a gene from part of the protein coat of the papaya ringspot virus into 36 plum trees in 1990. Similar genes have been used in other crops to protect them against other viruses.

Scorza nurtured the new transgenic plum trees in greenhouses at the ARS Appalachian Fruit

Research Station in Kearneysville, West Virginia.

Later, under very strict quarantine at ARS' Foreign Disease-Weed Science Research Laboratory in Frederick, Maryland, plant pathologist Vernon D. Damsteegt inoculated the transgenic trees with plum pox virus to test their resistance.

"For up to 19 months, one plant remained virus free; then it succumbed, as had all the others at various stages," Damsteegt reports.

In testing the new plants in the United States, Scorza worked closely with Damsteegt and with Laureen Levy, a plant virologist with USDA's Animal and Plant Health Inspection Service at Beltsville, Maryland.

"What we had was a gene that would delay the symptoms of the disease but, in the long run, wouldn't prevent the virus from attacking," Scorza says.

For crops like tomatoes, where you produce new plants each year, this symptom delay might be very helpful. But

tree crops take years to produce an initial yield, and the same trees produce year after year. Scorza says fruit trees would need the disease resistance to hold up for years.

So—back to the drawing board.

Working with Ravelonandro, who is with the INRA Centre de Recherche Agronomique in Bordeaux, France, Scorza got the gene for the coat protein directly from the plum pox virus. INRA is the French equivalent of the Agricultural Research Service.

"We then put this new gene into plum trees here in the lab and sent seedlings to France to be tested with the virus," says Scorza. "After 2 years of tests, we had one breeding line that appears to have complete immunity to plum pox virus."

This line will now be tested in Central European countries where the virus is rampant.

But Scorza says that further work is necessary to breed these new transgenic plants for fruit quality. "We'll be doing that here, as well as in France."

Levy, Damsteegt, and Scorza evaluate the resistance of the new transgenic hybrids at the ARS quarantine facility in Frederick.

"It's good to know that we now have a pretty good handle on this situation and have some control strategies ready, if plum pox hits our orchards," Scorza says.—By **Doris Stanley, ARS.**

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Typical symptoms of plum pox virus include lesions on fruit and discoloration of leaves.